

Name: _____

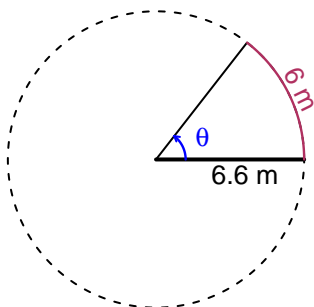
Date: _____

Trig Final (SLTN v615)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 6 meters. The radius is 6.6 meters. What is the angle measure in radians?

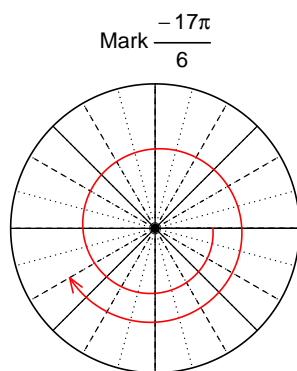


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 0.9091$ radians.

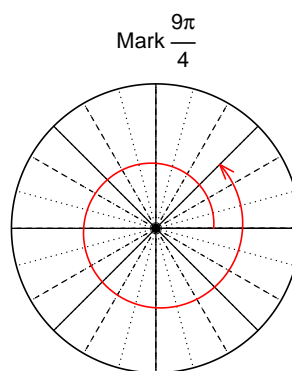
Question 2

Consider angles $-\frac{17\pi}{6}$ and $\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{17\pi}{6}\right)$ and $\sin\left(\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(-17\pi/6)$

$$\cos(-17\pi/6) = \frac{-\sqrt{3}}{2}$$



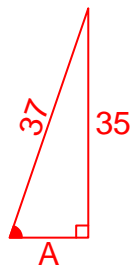
Find $\sin(9\pi/4)$

$$\sin(9\pi/4) = \frac{\sqrt{2}}{2}$$

Question 3

If $\sin(\theta) = \frac{-35}{37}$, and θ is in quadrant IV, determine an exact value for $\cos(\theta)$.

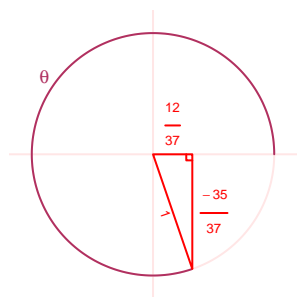
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}A^2 + 35^2 &= 37^2 \\A &= \sqrt{37^2 - 35^2} \\A &= 12\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\cos(\theta) = \frac{12}{37}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 7.57 Hz, a midline at $y = -5.66$ meters, and an amplitude of 4.08 meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 4.08 \sin(2\pi 7.57t) - 5.66$$

or

$$y = 4.08 \sin(15.14\pi t) - 5.66$$

or

$$y = 4.08 \sin(47.56t) - 5.66$$